

# Seventh-graders' experiences and wishes about mathematics teaching in Finland

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*The experiences and wishes of about five hundred Finnish seventh-graders towards mathematics teaching are surveyed using a postal questionnaire. The pupils' responses to three open-ended questions in the questionnaire are classified into six categories: Teacher/teaching, Mathematical topics, Learning control, Pupil, Interaction and working forms, and Resources. Most of the responses (65 - 70 %) are in the first two categories. In addition, a significant percentage (more than 10 %) of the responses are in the class "Pupil" for experiences and in "Interaction and working forms" for wishes. Differences in responses given by boys and girls are discussed and some general suggestions for change in mathematics instruction, based on pupils' experiences and wishes, are put forward.*

## Introduction

Over the last few years, many studies on the belief systems of teachers and pupils have been undertaken (e.g. Thompson, 1984; Cooney, 1985; Frank, 1985; Schoenfeld, 1985, 1989; Grouws et al., 1990; Kaplan, 1991; Zimmermann, 1991). Research has revealed that knowing the right facts, i.e. algorithms and procedures, does not necessarily guarantee success in solving mathematical problems. There are other factors – such as decisions made by the solver and the strategies he uses, as well as his emotional state at the time he is solving mathematical tasks – which have a major effect on the performance of a solver (Schoenfeld, 1985; Garofalo, 1989). “Purely cognitive” behaviour is rare. Belief systems shape cognition, even though some people may not be consciously aware of their beliefs (Schoenfeld, 1985, p. 35).

## Background

The results given in this paper form part of the background studies in the research project “Open Tasks in Mathematics” (Pehkonen & Zimmermann, 1989, 1990). The aim of the background study is to investigate the conceptions of Finnish teachers and seventh-graders concerning

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mathematics and mathematics teaching. Teachers' conceptions have been dealt with in earlier reports (Pehkonen, 1991, 1993). A survey of pupils' conceptions about mathematics teaching has previously been published (Pehkonen, 1992). In this article we will discuss the results from the pupils' responses to three open-ended questions in the survey study, questions concerning pupils' wishes and experiences of good and bad mathematics teaching. Differences in responses to the three questions are discussed as well as differences in responses to each question given by boys and girls.

### **Basic concepts**

#### *Who are the seventh graders?*

In Finland, we have a comprehensive school system where pupils move from the primary level (grades 1-6; ages 7-12 years) to the upper level (grades 7-9, ages 13-15 years) of comprehensive school. In primary school, the pupils do not have individual subject teachers. Their class teacher usually teaches every subject, including mathematics. The pupils have individual subject teachers in the higher school levels. Therefore, the experiences of the seventh-graders in this study are mostly based on the impressions they formed in the primary levels.

#### *What are wishes?*

Beliefs and belief systems are affected by the way people understand themselves and their surroundings. Belief systems can be seen to develop from simple perceptual beliefs – via new beliefs, conceptions, opinions and convictions – to a general conception of life (e.g. Saari, 1983, pp. 31-32). Wishes are close to expectations, and expectations are simple beliefs which can be traced back to perceptual experiences. The source of simple beliefs can also be some outside authority.

### **The realisation of the survey**

In the beginning of December 1988, a questionnaire was sent to a sample of mathematics teachers in the upper level of comprehensive school in Southern Finland. In the enclosed letter, the teachers were asked – if they were teaching a class of grade 7 – to deliver the questionnaire to their class, in order to have them filled in and they were asked to return them before January 15, 1989. The questionnaires were sent to 50 teachers, and 34 teachers returned the forms. Since the return percentage was rather high (68 %), no follow-up surveys were undertaken. Altogether 534 questionnaires were returned, but 20 of them were only filled in partly. The number of completed questionnaires was  $N = 514$ , where 260 questionnaires were from boys and 254 from girls.

## Questionnaire

The questionnaire used in the survey was developed for the mentioned research project (cf. Pehkonen & Zimmermann, 1990, pp. 83-85), and the purpose of the questionnaire<sup>1</sup> was to clarify pupils' conceptions, experiences, and wishes about mathematics teaching.

In the questionnaire, there are 32 statements about mathematics teaching. The pupils were asked to rate their opinions on a 5-step scale. At the end of the questionnaire, there were three open-ended questions. The first two enquired into the pupils' good and bad experiences of mathematics teaching, the third concerned their wishes for mathematics teaching. The complete questionnaire can be found in Pehkonen (1992). The open-ended questions are given below (in each of the three cases, there were two lines for the pupils' answers which have been omitted here):

- What kind of experiences do you have until today (from the primary level up to now) about mathematics teaching? Can you explain with a couple of words!  
good: .....  
bad: .....
- What wishes do you have for mathematics teaching? Can you explain with a couple of words!  
.....

## Statistics used

The responses to the open-ended questions were classified according to a category system based on common characteristics of school instruction (Appendix 1). The description of results was made at the level of percentage distributions, and contained a large variety of pupils' responses. The StatView-program on the MacIntosh computer was used for the analysis.

Some pupils ( $N = 18$ ) were subsequently interviewed, in order to assess the stability of their responses. The permanence of classification for responses to the open-ended questions was checked by parallel classification.

## Responses to the open questions

The total amount of responses to the three open-ended questions is given in Table 1. The average amount of answers per boy (ans./boy) and per girl (ans./girl) are given in two separate columns.

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1 The questionnaire was developed by prof. Bernd Zimmerman, Universität Hamburg, Germany.

	boys (%)	girls (%)	ans./boy	ans./girl
good experiences	225 (35)	297 (37)	0.87	1.17
bad experiences	210 (32)	285 (35)	0.81	1.12
wishes	216 (33)	231 (28)	0.83	0.91
<b>total</b>	<b>651 (100)</b>	<b>813 (100)</b>	<b>2.50</b>	<b>3.20</b>

Table 1. The total amount of responses to each open-ended question in absolute numbers and percentages and the average amount of responses per boy/girl.

Table 1 shows that the responses are distributed almost uniformly for the three questions, as could have been expected. The girls' average response rate to the open-ended questions is 3.20 and 2.50 for the boys.

### Main classification

In the classification of the responses, the starting point was the division of the teaching/learning situation into the themes teacher/pupil/mathematics. The pupils' responses were grouped into six main classes: (1) Teacher/teaching, (2) Mathematical topics, (3) Learning control, (4) Pupil, (5) Interaction and working forms, (6) Resources.

Table 2 presents the percentage distribution of all the responses according to this classification. Typical examples of the responses in each group are given later on.

In the distribution of the responses, the pattern is similar for boys and girls. Most answers are in the first and second category (Teacher /teaching, and Mathematical topics), altogether from 65 % to 70 %. Additionally, a significant percentage (more than 10 %) was in the fourth main

main classes		1	2	3	4	5	6
good experiences	boys	42	28	5	16	4	4
	girls	44	27	3	15	8	3
bad experiences	boys	39	20	13	15	5	8
	girls	46	19	8	19	3	5
wishes	boys	21	43	12	3	10	12
	girls	35	37	6	3	14	5

Table 2. Distribution of responses in percentages (1= Teacher/teaching, 2= Mathematical topics, 3= Learning control, 4= Pupil, 5= Interaction and working forms, 6= Resources).

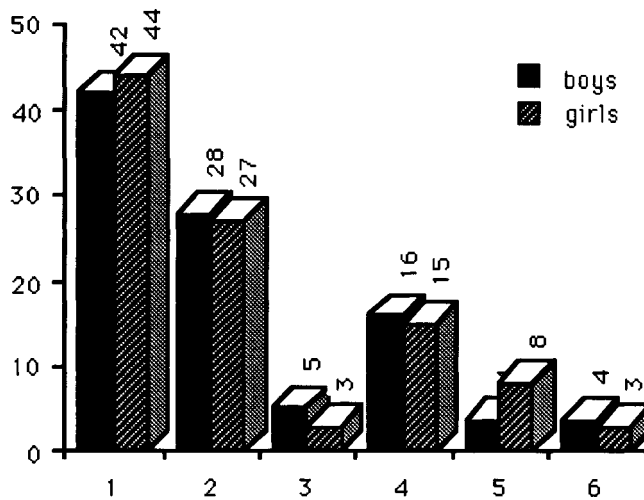


Figure 1. Distribution of pupils' good experiences in percentages.

class (Pupil) for experiences, and in the fifth main class (Interaction and working forms) for wishes. In the third and sixth category (Learning control, and Resources), the percentage of responses was rarely more than 10 %.

Each main class, numbered from 1 to 6, was in turn divided into sub-classes numbered 11,12 etc. (Appendix 1).

### Good experiences

The percentage distribution of pupils' good experiences (from Table 2) is given as a diagram in Figure 1, above.

The mode of the good experiences is in the first category (Teacher/teaching), where the amount of responses is more than two-fifths in both samples. Almost one-third of the responses have been gathered in the second main class (Mathematical topics). Additionally, the fourth category (Pupil) is about 15 % in both samples. The percentage distribution of the responses in these three categories and the differences between these percentages is given in Table 3 (for the number codes see Appendix 1).

#### *First main class (Teacher/teaching).*

In this class, there are 95 responses from the boys and 130 from the girls. The boys' responses are almost uniformly divided between the first subclass (General evaluation of teacher/teaching) and the second subclass (Evaluation of specific features). The girls give significantly more

subclasses	11	12	13	21	22	23	24	41	42	43	44	45
boys	51	48	2	22	51	8	19	46	19	3	30	3
girls	42	57	2	40	28	14	19	34	20	23	20	3
difference	+9	-9	0	-18	+23	-6	0	+12	-1	-20	+10	0

Table 3. Distribution of pupils' good experiences in some main classes in percentages (for the number codes see Appendix 1).

responses in the second subclass (cf. Table 3). Some typical expressions in the first subclass are: "good teachers", "teaching has been good", and "we were better taught at primary school". In the second subclass, good experiences are expressed with words like "teachers have explained the topics thoroughly", "teacher has helped much", and "peaceful working conditions".

#### **Second main class (Mathematical topics)**

In this class, there are 73 responses from the boys and 80 from the girls. In the first subclass (General evaluation of contents/problems/topics), the boys' share of the responses is about 20 % smaller than the girls' share, whereas the distribution is reversed for the second subclass (Evaluation of specific mathematical contents or procedures). Characteristic responses in the first subclass are: "easy tasks", "problems not always difficult", and "sometimes mathematics is interesting"; in the second subclass "one learned many practical things", and "basic things became clear". The third subclass (Evaluation of learning tools) contained about one-tenth of all responses. Some typical responses are "use of calculators", and "playing games". Additionally, there is the fourth subclass (Else) into which about one-fifth of the responses are classified in both samples; here the characteristic response is: "learned much".

#### **Fourth main class (Pupil)**

In this class, there are 37 responses from the boys and 44 from the girls. Almost half of the boys' responses and one-third of the girls' responses are dealing with pupils' understanding (the first subclass). Here, some typical responses are: "one has learned to calculate", "I have understood", and "I got the idea". In the second subclass (Cognitive component) and the fourth subclass (Notes), there are also a great number of responses in both samples: "I have learned well", and "good notes in classwork". Additionally, about one-fourth of the girls' responses are classified into the third subclass (Affective component), where the

following comments are typical: "I like mathematics", and "when one discovers new solutions".

### Summary

In the main classification of the good experiences (Figure 1), the responses of boys and girls were very similarly distributed. But the distribution within the main classes (Table 3) showed many differences.

The boys give significantly more specific evaluation in the case of mathematical topics (subclass 22) than the girls do, whereas the situation is reversed for general evaluation (subclass 21). As a slightly similar situation, the other way around however, is found for the results of the first main class. Additionally, the girls' responses emphasize affective component (subclass 43), whereas the boys give more expressions which stress pupils' understanding (subclass 41).

### Bad experiences

The distribution of pupils' bad experiences (from Table 2) is given in Figure 2.

Almost half of all bad experiences belong to the first category (Teacher/teaching). In the second (Mathematical Topics) and fourth (Pupil) category, the amount of the responses is almost 20 %. In the third category (Learning control), the percentage of the boys' responses exceed 10 %. The percentage distribution of the responses in these four categories is given in Table 4 (for the number codes see Appendix 1; here  $\nabla$  means that the proportion in Table 2 is under 10 %), and the differences between these percentages.

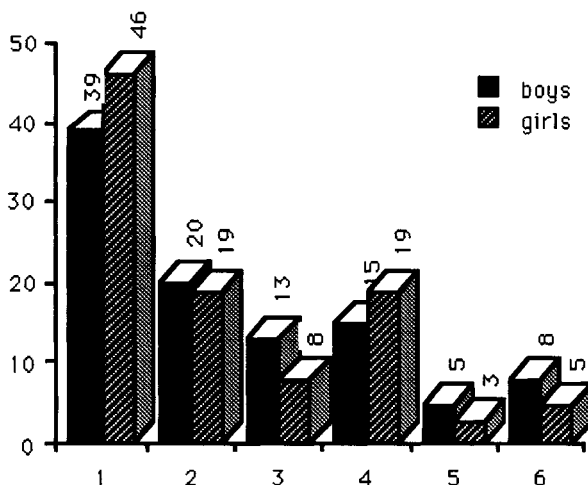


Figure 2. Distribution of pupils' bad experiences in percentages.

subclasses	11	12	13	21	22	23	24	31	32	41	42	43	44	45
boys	52	48	-	44	37	19	-	21	79	41	19	-	31	9
girls	38	61	1	50	48	2	-	∇	∇	59	13	15	11	2
difference	+14	-13	-1	-6	-11	+17	-	-	-	-18	+6	-15	+20	+7

Table 4. Distribution of pupils' bad experiences in some main classes in percentages (for the number codes see Appendix 1).

### **First main class (Teacher/teaching)**

In this class, there are 81 responses from the boys and 130 from the girls. The responses are divided in a very similar manner to the distribution of good experiences in the "Teacher/teaching"-category. They are distributed between the two first subclasses as follows: the boys' responses almost uniformly, and the girls' responses about 20 % more in favour of the second subclass (Evaluation of specific features). The most common words used to describe teacher/teaching are: "boring", "bad", "difficult", "quick". Some examples of pupils' expressions in the first subclass (General evaluation of teacher/teaching) are the following: "it was boring", "a bad teacher at primary level", "very difficult", and "teaching too quick". In the second subclass (Evaluation of specific features), some typical responses are: "not clearly explained", "unpleasant teacher", "teacher had not time to give advice", "too strict discipline", "memorizing", and "too much repetition".

### **Second main class (Mathematical topics)**

In this class, there are 43 responses from the boys and 54 from the girls. About half of the responses concern the first subclass (General evaluation of contents/problems/topics). The pupils complain that the problems are too difficult or boring: "complicated problems", "difficult ways to calculate", "some topics are boring", and "too many mechanical calculations". The amount of the responses classified into the second subclass (Evaluation of specific mathematical contents ...) was somewhat smaller (cf. Table 4). Some typical responses are "mental calculations", "word problems difficult", and "problems not useful". Additionally, one-fifth of the boys' responses concern the third subclass (Evaluation of learning tools), with words like "calculators not used".

### **Third main class (Learning control)**

Bad experiences of the boys (28 responses) are divided as follows: about one-fifth referring to class work/tests and four-fifths referring to homework. They complain about the amount of homework: "too much homework".



### ***Fourth main class (Pupil)***

In this class, there are 32 responses from the boys and 54 from the girls. The mode in both samples is in the first subclass (Understanding), only with a different weight – the difference was almost 20 %. The following examples show pupils' feelings: “*I have not understood all, nor do I now*”, and “*one did not always understand*”. One-third of boys' responses concern the quality of the teaching notes (the fourth subclass), the typical response is “*bad notes*”. One-fifth of the boys' responses are classified into the second subclass (Cognitive component), and more than 10 % of the girls' responses. Characteristic responses are “*you must study hard*”, and “*I learned some topics very slowly*”. In the third subclass (Affective component), there are additionally one-seventh of the girls' responses, e.g. “*I am not good in maths*”.

### ***Summary***

Considering the bad experiences of boys and girls globally, the distributions (Figure 2) seem to be rather similar. But when looking at the distribution of the responses within the subclasses (Table 4), we see that there are some clear differences between the responses given by boys and girls.

The boys express significantly more than the girls their dislike of notes (subclass 44). The girls complain more than the boys about the lack of pupils' understanding (subclass 41). Could an explanation for this be that girls usually are more satisfied with the given situation, or at least refrain from showing their dissatisfaction, whereas boys react more quickly, e.g. during mathematics lessons, if they are not satisfied? The boys' responses deal more frequently than the girls, with the lack of calculators and computers (subclass 23). The girls' responses emphasize affective components (subclass 43). The girls place more emphasis on evaluation of teacher and teaching (subclasses 11 and 12) than the boys do. It also seems as if the girls are able to express themselves more clearly than the boys.

### ***Wishes***

The percentage distribution of pupils' wishes (from Table 2) is given in Figure 3. The pupils' wishes are distributed in a different manner than their experiences: In the first category (Teacher/teaching) and the second category (Mathematical topics), there is an equal amount – about one-third – of the girls' responses in both, whereas the boys' responses are distributed otherwise: In the second category, there are twice as many responses as in the first category (Figure 3). In wishes, there are more than 10 % of the responses in the fifth and sixth category (Interaction

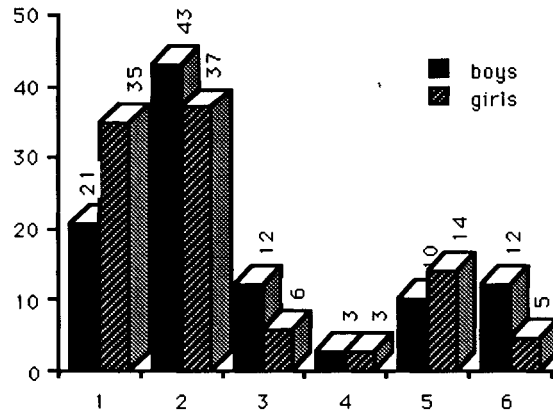


Figure 3. Distribution of pupils' wishes in the main classes in percentages.

and working forms, and Resources). In the third category (Learning control), the percentage of the boys' responses exceeds the limit of 10 %. The percentage distribution of the responses in these five categories is given in Table 5 (for the number codes see Appendix 1; here ∇ means that the share in Table 2 was under 10 %), and the differences between these percentages.

#### ***First main class (Teacher/teaching)***

In this class, there are 45 responses from the boys and 80 from the girls. The mode for both samples lies in the second subclass (Evaluation of specific features). The pupils want both more and less repetition, e.g. "there should be more repetition", and "less mechanical problems". There are wishes for a better quality of explanation as well as a more friendly and understanding form of teaching, e.g. "I would like to have more accurate explanations and teaching", "it should be more free", and "more relaxed". Secondly, the pupils want a better teacher (the first subclass) who would teach in a more relaxed manner in using different methods. E.g. "good teaching", "slower progress", "varying teaching", "we shouldn't change teachers too often, and "teaching more easier".

#### ***Second main class (Mathematical topics)***

In this class, there are 92 responses from the boys and 86 from the girls. About half of the wishes are in the third subclass (Evaluation of learning tools). Some typical expressions are "more learning games", "more calculators", and "working with computers". The second subclass (Evaluation of specific mathematical contents ...), contained about two-fifths of all responses. These are expressed with words like "more constructing of thing, e.g. box", "more problems to think about", "more

subclasses	11	12	13	21	22	23	24	31	32	51	52	53	54	55	61	62	63
boys	31	69	–	12	35	53	–	31	69	68	18	10	5	–	44	28	28
girls	45	55	–	16	43	41	–	∇	∇	72	6	19	3	–	∇	∇	∇
difference	–14	+14	–	–4	–8	+12	–	–	–	–4	+12	–9	+2	–	–	–	–

Table 5. Distribution of pupils' wishes in some subclasses in percentages (for the number codes see Appendix 1).

*practical problems*", and *"more word problems"*. Here, the amount of generally evaluating responses (the first subclass) was the smallest, about one-eighth. Some examples of the responses are *"easier problems"*, and *"something different and nice"*.

**Third main class (Learning control)**

About two-thirds of the boys' wishes (26 responses) are connected with home work (the second subclass). They want *"less home work"*.

**Fifth main class (Interaction and working forms)**

In this class, there are 22 responses from the boys and 32 from the girls. About two-thirds of the responses in both samples concern more differentiation during mathematics lessons (the first subclass), e.g. in the form of group work. In the pupils' words *"more working in groups"*, and *"more working in pairs"*. In the girls' responses, there are additionally about one-fifth of them who want more independence in their working mode (the third subclass), e.g. *"free working in groups"*, and *"more independent tasks"*. And in the boys' responses, about one-fifth of the wishes were concerned with more external differentiation (the second subclass) in the form of supplementary lessons, e.g. *"more supplementary teaching"*.

**Sixth main class (Resources)**

About half of the boys' wishes (25 responses) are concerned with teaching materials. They want *"easier maths books"*, and *"more tasks to be done in maths books"*.

**Summary**

The overall picture of wishes is very different from the responses to the other two questions. Here, the responses are more diverse than in pupils' experiences (Figure 3). The biggest difference in the pattern is that the boys' wishes are clearly more concentrated in the second category (Mathematical topics) than the girls' wishes. Within the main classes, there

are also differences between the percentages of boys' and girls' responses (Table 5), but they are not so notable and not so many as in pupils' bad experiences.

In wishes concerning teacher and teaching, the girls' responses were more generally evaluative (subclass 11), whereas the boys expressed their wishes more specifically (subclass 12). The boys wanted more computers and learning games (subclass 23) than the girls did and the boys also wanted more supplementary lessons (subclass 52).

## Discussion

Here, we will consider briefly questions about reliability and validity of this study. We will also discuss a summary of results.

### Reliability

In another study where the same questionnaire was used (Pehkonen & Tompa, 1994), two pupils, taken at random from each class, were interviewed (altogether  $N=18$ ), about a month after filling in the questionnaire. The goal of the interview was to estimate the consistency of pupils' answers in the questionnaire. In the interviews, the pupils changed their responses in 12.4 % cases of all their answers. This gives an estimate (88 %) of the repeatability of results (external reliability).

The reliability of the classification<sup>2</sup> was checked by twice classifying the first 50 papers. Comparing the first and the second classification, there were differences in 16 % of all the classification units.

### Validity

Extrapolation of the results (external validity), to make them applicable to all Finnish seventh graders, is questionable for the following reasons: The sample was not selected randomly. The survey was carried out with the help of the teachers who have attended one of the in-service courses arranged by the researcher. Therefore, the teachers who conducted the questionnaire in their classes form a positively selected sample, representing Finnish teachers who have applied for supplementary training. But their seventh-grade pupils have acquired most of their experiences and developed their attitudes already in primary school, since they had only been studying for five months with their current teacher. Therefore, the sample of pupils can be considered as representative of the seventh-graders in Southern Finland.

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<sup>2</sup> The classification of responses to the open-ended questions was done by Arja Wahlstedt.

## Summary of results

### *Similarities between boys and girls*

In the distribution of the responses, the pattern for the six main groups is similar for boys and girls in all three questions. Most answers are in the Teacher/teaching-, and Mathematical topics-categories, altogether from 65 % to 70 %. Additionally, a significant percentage (more than 10 %) is in the main class "Pupil" for experiences, and in the main class "Interaction and working forms" for wishes. In the third and sixth category (Learning control, and Resources), the percentage of responses was only occasionally more than 10 %.

The mode of the good experiences is in the first category (Teacher/teaching), where the amount of responses is more than two-fifths in both samples. Almost one-third of responses is to be found in the second main class (Mathematical topics). Additionally, the fourth category (Pupil) is about 15 % in both samples.

Almost half of all bad experiences belong to the first category (Teacher/teaching). In the second (Mathematical Topics) and fourth (Pupil) category, the amount of the responses is almost 20 %. In the third category (Learning control), the percentage of the boys' responses exceeds 10 %.

Pupils' wishes are distributed in a different manner than their experiences: In the first category (Teacher/teaching) and the second category (Mathematical topics), there is an equal amount - about one-third - of the girls' responses in both, whereas the boys' responses are divided differently: In the second category, there are twice as many responses as in the first category. To the question about wishes, we find more than 10 % of the responses in the fifth and sixth category (Interaction and working forms, and Resources) and in the third category (Learning control), the percentage of the boys' responses exceeds the limit of 10 %.

### *Differences between boys and girls*

In good experiences, the distribution of responses within the main classes shows many differences: The boys give significantly more specific evaluations in the case of Mathematical topics than the girls do, whereas the situation is different for the general evaluation. A slightly similar situation, the other way around however, is found in the results of the Teacher/teaching category. Additionally, the girls' responses emphasize affective components, whereas the boys are more in favour of expressions which stress pupils' understanding.

When looking at the distribution of the responses in bad experiences within the main classes, there are some differences. The boys express significantly more than the girls their dislike of notes. The girls are

more than the boys complaining about the lack of pupils' understanding. The boys' responses are more than the girls' responses concerned with the lack of calculators and computers. The girls' responses emphasize more the affective components. The girls give a more detailed evaluation of the teacher and the teaching situation than the boys do.

The boys' wishes are clearly more concentrated within the Mathematical topics category than the girls' wishes. Within the main classes, there are also differences between the percentages of boys' and girls' responses, but they are not as notable and varied as e.g. in pupils' bad experiences. In wishes concerning Teacher/teaching, the girls' responses are more generally evaluative, whereas the boys express their wishes more specifically. The boys also want more computers and learning games than the girls do and the boys want more supplementary lessons.

### Concluding note

In order to improve mathematics teaching, we should, if possible, take pupils' wishes about mathematics teaching into account. These wishes are rooted in pupils' mathematical beliefs, and as such they have a powerful impact on learning. From the results of this survey, we can propose some immediate management strategies: In the pupils' responses there are wishes for a better quality of teaching (better explanations), wishes for more open teaching (learning games, problems to think about), wishes for alternative organisation of mathematics lessons (working in groups or pairs, independent working), and for the use of technical tools (more calculators, computers).

All these wishes are compatible with ways of teaching which rely on a constructivist learning theory. Why don't we try to realize them?

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## Appendix 1

The categories of responses in the free questions

### 1. Teacher/teaching

- 11 General evaluation of teacher/teaching
- 12 Evaluation of specific features (like Quality of explaining, Friendly teaching, Helpfulness, Patience, ability to hear, Keeping discipline, Repetition/practice, Equality in dealing with pupils, Challenging of pupils, Structuring of teaching)
- 13 Else (like Absences of teacher)

### 2. Mathematical topics

- 21 General evaluation of contents/problems/topics
- 22 Evaluation of specific mathematical contents or procedures (like Geometry, Mental calculation, Basic calculations, Word problems, Algebra, Set theory, Fractions, Percentages, Practicality, application, usefulness, Logical thinking/puzzles, Function, Number sequences, Probability, History of mathematics)
- 23 Evaluation of learning tools (like Computer/calculator, Learning games, Textbook working/calculating)
- 24 Else

### 3. Learning control

- 31 Class work/tests
- 32 Home work

### 4. Pupil

- 41 Understanding
- 42 Cognitive component (like Cognitive self-concept/cognitive style)
- 43 Affective component (like Motivation, Self-esteem, affective self-concept, Anxiousness)
- 44 Notes
- 45 Else (like Absence of the pupil, Expressions of an adolescent, Pupil's rights)

### 5. Interaction and working forms

- 51 Inner differentiation (like Group work, Working together/working in pairs)
- 52 Outer differentiation (like Private teaching /supplementary lessons, Clubs, competitions etc.)
- 53 Progressive working (like Independent working /independency, Discussions of problems)
- 54 Traditional working (like Working at the blackboard)
- 55 Else (like Attitude of class mates)

### 6. Resources

- 61 Teaching materials (like Text books, Other materials)
- 62 Amount of lessons
- 63 Else



## Årskurs 7-elevens erfarenheter av och önskemål om matematikundervisning i Finland

### *Sammanfattning*

Över fem hundra finska åk 7-elever har tillfrågats om sina erfarenheter av och önskemål om matematikundervisning. Elevernas svar på tre öppna frågor i en enkät har klassificerats i sex kategorier: "Lärare/undervisning", "Matematikämnets innehåll", "Kontroll av inläring", "Elev", "Interaktion och arbetsformer" samt "Hjälpmedel". Huvuddelen (65-70%) av svaren på de tre öppna frågorna finns i de båda första kategorierna. Dessutom finns en icke obetydlig andel (mer än 10 %) av svaren i kategorin "Elev" vad gäller erfarenheter och "Interaktion och arbetsformer" vad gäller önskemål. Skillnader i svaren mellan pojkar och flickor diskuteras och det ges några generella förslag till förändringar av matematikundervisningen, baserade på elevernas erfarenheter och önskemål.

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